

WHAT IS CLAIMED IS:

1. An internal combustion engine, comprising:

a body defining at least a portion of a combustion chamber, the combustion chamber adapted to receive a combustion mixture;

a compression member in the combustion chamber adapted to substantially seal with the body and movable to compress the combustion mixture;

a cavity in the body having an open end in fluid communication with the combustion chamber, the cavity being adapted to receive a portion of the combustion mixture in the combustion chamber through the open end such that substantially all of the combustion mixture received in the cavity is the combustion mixture received from the combustion chamber and further adapted to create a substantially quiescent area therein;

an ignition source residing in the cavity substantially at an end of the cavity opposing the open end; and

an apertured member adjacent to the ignition source and having one or more apertures therein, the apertures operable to allow passage of the combustion mixture to the ignition source and, upon ignition of the combustion mixture in the cavity, jet a portion of the ignited combustion mixture into the combustion chamber.

2. The internal combustion engine of claim 1 wherein the combustion mixture is a diluted charge.

3. The internal combustion engine of claim 1 wherein the compression member is a piston reciprocating in the combustion chamber.

4. The internal combustion engine of claim 1 wherein the body is a cylinder head.

5. The internal combustion engine of claim 1 further comprising a carrier housing removably received in the body; and

wherein the ignition source is carried by the carrier housing.

6. The internal combustion engine of claim 5 wherein the apertured member resides on the carrier housing.

1 7. The internal combustion engine of claim 6 wherein the apertured member is a
2 housing encasing at least a portion of the ignition source.

1 8. The internal combustion engine of claim 1 wherein the apertured member is a
2 housing encasing at least a portion of the ignition source.

1 9. The internal combustion engine of claim 1 wherein the apertured member is between
2 the open end and the ignition source.

1 10. The internal combustion engine of claim 1 wherein the ignition source is at the end of
2 the cavity opposing the open end.

1 11. The internal combustion engine of claim 1 wherein the ignition source is a center and
2 ground electrodes of a spark plug.

1 12. The internal combustion engine of claim 11 wherein the apertured member resides on
2 the spark plug.

1 13. The internal combustion engine of claim 1 wherein the body is adapted to receive at
2 least a first carrier housing and a second carrier housing, the first carrier housing adapted
3 to position the ignition source in relation to the combustion chamber at a different
4 position than the second carrier housing.

1 14. The internal combustion engine of claim 1 wherein the body is adapted to receive at
2 least a first carrier housing and a second carrier housing, the first carrier housing adapted
3 to carry the ignition source and having the apertured member thereon and the second
4 carrier housing adapted to carry the ignition source and that omits the apertured member.

1 15. The internal combustion engine of claim 1 wherein the ignition source is a center and
2 ground electrodes of a spark plug; and
3 wherein cavity is substantially cylindrical and a longitudinal central axis of the cavity
4 substantially coincides with a longitudinal central axis of the spark plug.

1 16. A carrier for receiving an ignition source and mounting in an internal combustion
2 engine, the internal combustion engine having at least one combustion chamber, the
3 carrier comprising:

4 a carrier housing adapted to receive the ignition source; and
5 an exterior shoulder on the housing adapted to abut the internal combustion engine
6 and position the carrier in relation to the internal combustion engine with the ignition
7 source outside of the combustion chamber, the carrier housing further adapted to
8 cooperate with the internal combustion engine to form a substantially quiescent area
9 about the ignition source.

1 17. The carrier of claim 16 wherein the ignition source is a center and at least one ground
2 electrode of a spark plug.

1 18. The carrier of claim 17 further comprising an internal shoulder in the housing adapted
2 to abut the spark plug and position the spark plug axially in relation to the carrier
3 housing; and

4 wherein the internal shoulder and the external shoulder cooperate to position at least
5 the center electrode outside of the combustion chamber.

1 19. The carrier of claim 16 wherein the carrier housing is substantially tubular; and
2 wherein the carrier further comprises an apertured shield at one end of the carrier
3 housing adapted to jet fluids within the carrier into the internal combustion engine.

1 20. The carrier of claim 16 wherein the carrier is adapted to threadingly engage the
2 internal combustion engine.

1 21. The carrier of claim 16 wherein the carrier is adapted to be clamped to the internal
2 combustion engine.

1 22. The carrier of claim 16 wherein the carrier housing is adapted to receive a spark plug
2 having a shield housing substantially encasing at least a portion of the spark plug.
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1 23. A carrier for receiving a spark plug and mounting in an internal combustion engine,
2 comprising:

3 a substantially tubular carrier housing adapted to receive a spark plug therein; and
4 an apertured housing at one end of the carrier housing having one or more apertures
5 adapted to allow passage of fluids into an interior of the carrier housing and to jet at least
6 a portion of the fluids out of the carrier housing when at least a portion of the fluids is
7 ignited, the carrier housing adapted to cooperate with at least the apertured housing to
8 form a substantially quiescent area about the ignition source.

1 24. The carrier of claim 23 further comprising an external shoulder on the carrier housing
2 adapted to abut the internal combustion engine and position the carrier in relation to the
3 internal combustion engine with the spark plug outside of a combustion chamber of the
4 engine.

1 25. The carrier of claim 24 further comprising an internal shoulder in the carrier housing
2 adapted to abut the spark plug and axially position the spark plug relative to the carrier
3 housing.

1 26. The carrier of claim 23 wherein the internal combustion engine has a combustion
2 chamber and a cavity in communication with the combustion chamber; and
3 wherein the carrier housing is adapted to be received in the cavity.

1 27. The carrier of claim 23 wherein the carrier housing is adapted to threadingly engage
2 the internal combustion engine.

1 28. The carrier of claim 23 wherein the carrier is adapted to be clamped to the internal
2 combustion engine.

- 1 29. A method of combusting a dilute combustion mixture in a combustion chamber of an
2 internal combustion engine, comprising:
3 receiving a dilute combustion mixture in the combustion chamber;
4 receiving at least a portion of the dilute combustion mixture from the combustion
5 chamber through an open end of a cavity such that substantially all of the combustion
6 mixture in the cavity is the dilute combustion mixture received from the combustion
7 chamber, the cavity being outside of the combustion chamber and substantially protecting
8 at least a portion of the dilute combustion mixture adjacent the ignition source from fluid
9 flows in the combustion chamber without inducing substantial additional flows adjacent
10 the ignition source;
11 with an ignition source in the cavity opposite the open end, igniting the dilute
12 combustion mixture in the cavity; and
13 with the ignited dilute combustion mixture from the cavity, igniting at least a portion
14 of the dilute combustion mixture in the combustion chamber.
- 1 30. The method of claim 29 further comprising jetting combusting dilute combustion mixture
2 from the cavity into the combustion chamber through at least one aperture.
- 1 31. The method of claim 29 wherein the ignition source is a spark plug.
- 1 32. The method of claim 29 wherein the internal combustion engine is a reciprocating
2 internal combustion engine.
- 1 33. The method of claim 29 wherein igniting the dilute combustion mixture in the cavity
2 comprises supplying a voltage to the ignition source that is less than a voltage that would
3 be required by the ignition source were it positioned outside of the cavity and in the
4 combustion chamber.
- 1 34. The method of claim 29 wherein a temperature of the ignition source is less than a
2 temperature of the ignition source were it positioned outside of the cavity and in the
3 combustion chamber.

1 35. A component of an internal combustion engine system comprising:

2 a body defining at least a portion of a combustion chamber, the combustion chamber
3 adapted to receive a combustion mixture;

4 a compression member in the combustion chamber adapted to substantially seal with
5 the body and movable to compress the combustion mixture;

6 a cavity in the body having an open end in fluid communication with the combustion
7 chamber, the cavity being adapted to receive a portion of the combustion mixture in the
8 combustion chamber through the open end such that substantially all of the combustion
9 mixture received in the cavity is the combustion mixture received from the combustion
10 chamber; and

11 an ignition source residing in the cavity, the cavity adapted to create a substantially
12 quiescent area about the ignition source.

1 36. The component of an internal combustion engine system of claim 35 wherein the
2 combustion mixture is a diluted charge.

1 37. The component of an internal combustion engine system of claim 35 wherein the
2 body is a cylinder head.

1 38. The component of an internal combustion engine system of claim 35 further
2 comprising a carrier housing removably received in the body; and
3 wherein the ignition source is carried by the carrier housing.

1 39. The component of an internal combustion engine system of claim 38 further
2 comprising an apertured member residing on the carrier housing.

1 40. The component of an internal combustion engine system of claim 39 wherein the
2 apertured member is a housing encasing at least a portion of the ignition source.

1 41. The component of an internal combustion engine system of claim 35 further
2 comprising an apertured member encasing at least a portion of the ignition source.

1 42. The component of an internal combustion engine system of claim 41 wherein the
2 apertured member is between the open end and the ignition source.

1 43. The component of an internal combustion engine system of claim 35 wherein the
2 ignition source is at the end of the cavity opposing the open end.

1 44. The component of an internal combustion engine system of claim 35 wherein the
2 ignition source is a center and ground electrodes of a spark plug.

1 45. The component of an internal combustion engine system of claim 35 wherein the
2 body is adapted to receive at least a first carrier housing and a second carrier housing, the
3 first carrier housing adapted to position the ignition source in relation to the combustion
4 chamber at a different position than the second carrier housing.

1 46. The component of an internal combustion engine system of claim 35 wherein the
2 body is adapted to receive at least a first carrier housing and a second carrier housing, the
3 first carrier housing adapted to carry the ignition source and having the apertured member
4 thereon and the second carrier housing adapted to carry the ignition source and that omits
5 the apertured member.